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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Martin et al.		
Assignee:	Maxtor Corporation		
Title:	DEVICE AND METHOD FOR IMPROVED STICTION RELIABILITY IN DISK DRIVES EMPLOYING PADDED SLIDERS		
Serial No.:	09/768,976	Filed:	January 23, 2001
Examiner:	Blouin, M.	Group Art Unit:	2653
Atty. Docket No.:	Q01-1001-US1		

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APPEAL BRIEF
(37 C.F.R. § 1.192)

This Appeal Brief is in furtherance of the Notice of Appeal filed concurrently herewith.

Please charge the $320 fee for filing this Appeal Brief to Deposit Account No. 13-0016/Q01-1001-US1 and charge any underpayment or credit any overpayment to this Account.

This paper is submitted in triplicate.

The index of subject matter is as follows:

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Maxtor Corporation.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

Claims in the application are: 1-40

B. Status of All Claims

1. Claims canceled: NONE
2. Claims withdrawn: NONE
3. Claims pending: 1-40
4. Claims allowed: NONE
5. Claims rejected: 1-40

C. Claims on Appeal

Claims on appeal are: 1-40

IV. STATUS OF AMENDMENTS

A Response filed after the outstanding Office Action dated May 6, 2003 amends claims 23 and 34.

V. SUMMARY OF INVENTION

The present invention is generally directed to a disk drive that includes a slider and a storage disk (Specification, page 3, lines 29-31). The "pitch static attitude" defines the free angle formed between the slider and the horizontal when the slider is positioned at the normal flying height (Specification, page 4, lines 1-3). The slider is maintained at a pitch static attitude of less than approximately zero degrees, such as between approximately zero degrees and negative two degrees (Specification, page 4, lines 4-7). A negative pitch static attitude inhibits the slider from rotating and tipping during motor cogs or disk drive shocks, and minimizes the likelihood of contact between the non-padded portion of the slider and the disk during start up and shut down phases (Specification, page 4, lines 7-13). As a result, the negative pitch static attitude minimizes the likelihood of stiction failure and extends the life of the disk drive (Specification, page 4, lines 13-14).

Figures 2-5 illustrate disk drive 10 that includes storage disk 12 and slider 22 (Specification, page 5, lines 11-15). Slider 22 includes pads 28 that reduce stiction between slider 22 and storage disk 12 (Specification, page 5, lines 15-18). Slider 22 is maintained at pitch static attitude 29 that inhibits slider 22 from rotating and/or tipping off pads 28 when slider 22 contacts storage disk 12, thereby reducing stiction (Specification, page 5, lines 19-23). Pitch static attitude 29 is between approximately zero degrees and negative two degrees (Specification, page 9, lines 12-14).

Figure 6 illustrates that the stiction between slider 22 and storage disk 12 is substantially less when the pitch static attitude is less than zero degrees than if the pitch static attitude is greater than or equal to zero degrees.

VI. ISSUES

The issues on appeal are (1) whether claims 22 and 34 should be objected to under 37 C.F.R. § 1.75, (2) whether claims 1-3, 5, 8-10, 12-18 and 20-40 are anticipated under 35 U.S.C. § 102(b) by *Arya et al.* (U.S. Patent 5,739,982), (3) whether claims 4 and 11 are unpatentable under 35 U.S.C. § 103(a) over *Arya et al.*, (4) whether claims 6 and 19 are unpatentable under 35 U.S.C. § 103(a) over *Arya et al.* in view of *Jacques* (U.S. Patent 5,612,839), and (5) whether claim 7 is unpatentable under 35 U.S.C. § 103(a) over *Arya et al.* in view of *Battu et al.* (U.S. Patent 5,841,610).

VII. GROUPING OF CLAIMS

For the first issue, the claims stand and fall together.

For the second issue, the claims do not stand and fall together and are grouped as follows: (i) claims 1-3, 5, 8-10 and 12-18, (ii) claims 20-23, (iii) claim 24, (iv) claim 25, (v) claim 26, (vi) claim 27, (vii) claim 28, (viii) claim 29, (ix) claim 30, (x) claims 31-34, (xi) claim 35, (xii) claim 36, (xiii) claim 37, (xiv) claim 38, (xv) claim 39, and (xvi) claim 40.

For the third issue, the claims stand and fall together.

For the fourth issue, the claims stand and fall together.

For the fifth issue, claim 7 is the sole claim.

VIII. ARGUMENTS

I. CLAIM OBJECTIONS

Claims 22 and 34 are objected to as being substantial duplicates of claims 21 and 33, respectively.

Claims 22 and 23 recite "The disk drive of claim 20 wherein the pitch static attitude is between negative one-half degree and negative two degrees." Similarly, claims 33 and 34 recite "The disk drive of claim 31 wherein the pitch static attitude is between negative one-half degree and negative two degrees." Thus, claims 22 and 23 (rather than claims 21 and 22) and claims 33 and 34 are duplicates of one another.

In the Response filed concurrently herewith, claims 23 and 34 have been amended to recite "the pitch static attitude is approximately negative two degrees." Therefore, claims 23 and 34 are no longer duplicative of claims 22 and 33, respectively.

II. SECTION 102 REJECTIONS – ARYA ET AL.

Claims 1-3, 5, 8-10, 12-18 and 20-40 are rejected under 35 U.S.C. § 102(b) as being anticipated by *Arya et al.* (U.S. Patent 5,739,982).

Arya et al. discloses disk drive 130 that includes disk stack assembly 134 and head stack assembly 136. Disk stack assembly 134 include disk 138. Head stack assembly 136 includes integrated suspension assembly 50 mounted on actuator arm 146. Integrated suspension assembly 50 includes slider 48, load beam 58, flexure 60, mount plate 62, multi-connector 63 and leads 64. Slider 48 carries a magnetic head for reading and writing magnetic signals on disk 138. Leads 64 extend from slider 48 to multi-connector 63.

Leads 64 are treated by localized infrared radiation or laser energy to provide a more uniform grain structure, thereby allowing plastic deformation to occur sooner, reducing cracking and relieving mechanical stresses.

Table 1 compares the pitch static attitude for components that have not been laser treated to components that have been laser treated. For components that have not been laser treated, the standard deviation is 1.24. For components that have been laser treated, the standard deviation is 0.68. For components that have been post bond laser treated, the standard deviation is 0.40.

Table 1 demonstrates that the laser treatment reduces variability in pitch static attitude from part to part.

Claims 1-3, 5, 8-10 and 12-18 (Group I)

Claims 1, 8 and 14 recite "the head suspension maintaining the slider pitch at a pitch static attitude of less than zero degrees during the data transfer operations, wherein stiction between the slider and the storage disk is substantially less than if the pitch static attitude was greater than zero degrees during the data transfer operations."

Arya et al. fails to teach or suggest this approach. In particular, *Arya et al.* says nothing about the amount of stiction between slider 48 and disk 138, much less that the stiction between slider 48 and disk 138 varies as a function of pitch static attitude of slider 48, much less that the stiction between slider 48 and disk 138 is substantially less when slider 48 has pitch static attitude of less than zero degrees during data transfer operations than if slider 48 had pitch static attitude of greater than zero degrees during data transfer operations.

In sustaining this rejection, the Examiner asserts that "Arya et al. shows . . . stiction between the slider a [sic] storage disk is substantially less than if the pitch static attitude was greater than zero degrees during data transfer operations (Col. 7, Table 1)." This is clearly erroneous. Table 1 merely reports pitch static attitude results for various test conditions that include laser treatment. Table 1 says nothing about stiction.

Claims 20-23 (Group II)

Claim 20 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group I claims and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 20 recites "the slider has a pitch static attitude of less than zero degrees during the data transfer operations, and stiction between the slider and the storage disk is substantially less than if the pitch static attitude was zero degrees during the data transfer operations."

Arya et al. fails to teach or suggest this approach. In particular, *Arya et al.* says nothing about the amount of stiction between slider 48 and disk 138, much less that the stiction between slider 48 and disk 138 is substantially less when slider 48 has pitch static attitude of less than zero degrees during data transfer operations than if slider 48 had pitch static attitude of zero degrees during data transfer operations.

Claim 24 (Group III)

Claim 24 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group II claims and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 24 recites "the stiction is at least 50% less than if the pitch static attitude was zero degrees during the data transfer operations."

Arya et al. fails to teach or suggest this approach. In particular, *Arya et al.* says nothing about the amount of stiction between slider 48 and disk 138, much less that the stiction between slider 48 and disk 138 is at least 50% less when slider 48 has pitch static attitude of less than zero degrees during data transfer operations than if slider 48 had pitch static attitude of zero degrees during data transfer operations.

In sustaining this rejection, the Examiner asserts that "The data in Table 1 of Arya et al encompasses the specified operating ranges and, therefore, would yield similar stiction values." This is clearly erronous. The claimed stiction values are not somehow inherent to the claimed pitch static attitude.

The M.P.E.P. discusses inherency in an anticipation rejection as follows:

> To serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. M.P.E.P. § 2131.01.

Unfortunately, the Examiner has not even attempted to cite extrinsic evidence that makes clear that the claimed stiction values are necessarily present in *Arya et al.* Instead, the Examiner has resorted to deeming that *Arya et al.* would yield the claimed stiction values without any support in *Arya et al.* or elsewhere.

Claim 25 (Group IV)

Claim 25 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group III claim and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 25 recites "the stiction is at least 66% less than if the pitch static attitude was zero degrees during the data transfer operations."

Arya et al. fails to teach or suggest this approach, as explained above for the Group III claim.

Claim 26 (Group V)

Claim 26 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group III claim and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 26 recites "the stiction is at least 75% less than if the pitch static attitude was zero degrees during the data transfer operations."

Arya et al. fails to teach or suggest this approach, as explained above for the Group III claim.

Claim 27 (Group VI)

Claim 27 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group II claims and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 27 recites "the stiction is at least 2 grams less than if the pitch static attitude was zero degrees during the data transfer operations."

Arya et al. fails to teach or suggest this approach. In particular, *Arya et al.* says nothing about the amount of stiction between slider 48 and disk 138, much less that the stiction between slider 48 and disk 138 is at least 2 grams less when slider 48 has pitch static attitude of less than zero degrees during data transfer operations than if slider 48 had pitch static attitude of zero degrees during data transfer operations.

In sustaining this rejection, the Examiner asserts that "The data in Table 1 of Arya et al encompasses the specified operating ranges and, therefore, would yield similar stiction values." This is clearly erronous. The claimed stiction values are not somehow inherent to the claimed pitch static attitude.

The M.P.E.P. discusses inherency in an anticipation rejection as follows:

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Unfortunately, the Examiner has not even attempted to cite extrinsic evidence that makes clear that the claimed stiction values are necessarily present in *Arya et al.* Instead, the Examiner has resorted to deeming that *Arya et al.* would yield the claimed stiction values without any support in *Arya et al.* or elsewhere.

Claim 28 (Group VII)

Claim 28 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group VI claim and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 28 recites "the stiction is at least 3 grams less than if the pitch static attitude was zero degrees during the data transfer operations."

Arya et al. fails to teach or suggest this approach, as explained above for the Group VI claim.

Claim 29 (Group VIII)

Claim 29 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group VI claim and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 29 recites "the stiction is at least 4 grams less than if the pitch static attitude was zero degrees during the data transfer operations."

Arya et al. fails to teach or suggest this approach, as explained above for the Group VI claim.

Claim 30 (Group IX)

Claim 30 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group II claims and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 30 recites "the slider includes an air bearing surface and a pad that extends below the air bearing surface and contacts the storage disk when the stiction occurs."

Arya et al. fails to teach or suggest this approach. In particular, *Arya et al.* says nothing about slider 48 including a pad that contacts disk 138.

Claim 31-34 (Group X)

Claim 31 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group II claims and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 31 recites "a slider including . . . a plurality of pads, wherein . . . the pads contact the storage disk when the stiction occurs."

Arya et al. fails to teach or suggest this approach. In particular, *Arya et al.* says nothing about slider 48 including a plurality of pads that contact disk 138.

Claim 35 (Group XI)

Claim 35 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group X claims and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 35 recites "the stiction is at least 50% less than if the pitch static attitude was zero degrees during the data transfer operations."

Arya et al. fails to teach or suggest this approach, as explained above for the Group III claim.

Claim 36 (Group XII)

Claim 36 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group X claims and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 36 recites "the stiction is at least 66% less than if the pitch static attitude was zero degrees during the data transfer operations."

Arya et al. fails to teach or suggest this approach, as explained above for the Group III claim.

Claim 37 (Group XIII)

Claim 37 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group X claims and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 37 recites "the stiction is at least 75% less than if the pitch static attitude was zero degrees during the data transfer operations."

Arya et al. fails to teach or suggest this approach, as explained above for the Group III claim.

Claim 38 (Group XIV)

Claim 38 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group X claims and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 38 recites "the stiction is at least 2 grams less than if the pitch static attitude was zero degrees during the data transfer operations."

Arya et al. fails to teach or suggest this approach, as explained above for the Group VI claim.

Claim 39 (Group XV)

Claim 39 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group X claims and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 39 recites "the stiction is at least 3 grams less than if the pitch static attitude was zero degrees during the data transfer operations."

Arya et al. fails to teach or suggest this approach, as explained above for the Group VI claim.

Claim 40 (Group XVI)

Claim 40 patentably distinguishes over *Arya et al.* for the reasons set forth above for the Group X claims and further patentably distinguishes over *Arya et al.* on its own merits since it recites another limitation that is not disclosed by *Arya et al.*

Claim 40 recites "the stiction is at least 4 grams less than if the pitch static attitude was zero degrees during the data transfer operations."

Arya et al. fails to teach or suggest this approach, as explained above for the Group VI claim.

Claims 1-3, 5, 8-10, 12-18 and 20-40 (Groups I-XVI)

Under 35 U.S.C. §102, anticipation requires that each and every element of the claimed invention be disclosed in the prior art. *Akzo N.V. v. United States International Trade Commission*, 1 USPQ 2d 1241, 1245 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987). That is, the reference must teach every aspect of the claimed invention. M.P.E.P. § 706.02.

III. SECTION 103 REJECTIONS– ARYA ET AL.

Claims 4 and 11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Arya et al.*

Claims 4 and 11 distinguish over *Arya et al.* for the reasons set forth above for the Group I claims.

IV. SECTION 103 REJECTIONS– ARYA ET AL. AND JACQUES

Claims 6 and 19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Arya et al.* in view of *Jacques* (U.S. Patent 5,612,839).

Claims 6 and 19 distinguish over *Arya et al.* for the reasons set forth above for the Group I claims, and *Jacques* fails to cure these deficiencies.

V. SECTION 103 REJECTION– ARYA ET AL. AND BATTU ET AL.

Claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Arya et al.* in view of *Battu et al.* (U.S. Patent 5,841,610).

Claim 7 distinguishes over *Arya et al.* for the reasons set forth above for the Group I claims, and *Battu et al.* fails to cure these deficiencies.

VI. CONCLUSION

For the reasons given above, Applicant respectfully submits that claims 1-40 are in condition for allowance and respectfully requests that the outstanding objections and rejections be overturned.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on May 19, 2003.

D Sigmond — 5/19/03

David M. Sigmond
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Date of Signature

Respectfully submitted,

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IX. APPENDIX OF CLAIMS INVOLVED IN THE APPEAL

1. A disk drive, comprising:

a storage disk;

an actuator arm that moves relative to the storage disk;

a load beam secured to the actuator arm;

a slider including a data transducer that exchanges information with the storage disk during data transfer operations; and

a head suspension that secures the slider to the load beam and positions the slider near the storage disk, the head suspension maintaining the slider pitch at a pitch static attitude of less than zero degrees during the data transfer operations, wherein stiction between the slider and the storage disk is substantially less than if the pitch static attitude was greater than zero degrees during the data transfer operations.

2. The disk drive of claim 1 wherein the head suspension maintains the slider at a pitch static attitude of between zero and approximately negative two degrees.

3. The disk drive of claim 1 wherein the head suspension maintains the slider at a pitch static attitude of less than approximately negative one degree.

4. The disk drive of claim 1 wherein the head suspension maintains the slider at a pitch static attitude of approximately negative two degrees.

5. The disk drive of claim 1 wherein the head suspension maintains the slider at a pitch static attitude of less than approximately negative two degrees.

6. The disk drive of claim 1 wherein the slider is a padded slider that includes an air bearing surface and at least one pad that extends below the air bearing surface and contacts the storage disk when the stiction occurs.

7. The disk drive of claim 1 including a ramp positioned near an outer diameter of the storage disk.

8. A transducer assembly for a disk drive, the disk drive including a storage disk and an actuator arm, the transducer assembly comprising:

a slider including a data transducer that exchanges information with the storage disk during data transfer operations;

a load beam that attaches to the actuator arm; and

a head suspension that secures the slider to the load beam and positions the slider near the storage disk, the head suspension maintaining the slider pitch at a pitch static attitude of less than zero degrees during the data transfer operations, wherein stiction between the slider and the storage disk is substantially less than if the pitch static attitude was greater than zero degrees during the data transfer operations.

9. The transducer assembly of claim 8 wherein the head suspension maintains the slider at a pitch static attitude of between zero and approximately negative two degrees.

10. The transducer assembly of claim 8 wherein the head suspension maintains the slider at a pitch static attitude of less than approximately negative one degree.

11. The transducer assembly of claim 8 wherein the head suspension maintains the slider at a pitch static attitude of approximately negative two degrees.

12. A head stack assembly including an actuator arm and the transducer assembly of claim 8.

13. A disk drive including the transducer assembly of claim 8.

14. A method of making a disk drive, the method comprising the steps of:

providing a storage disk;

providing an actuator arm that moves relative to the storage disk;

providing a slider including a data transducer that exchanges information with the storage disk during data transfer operations;

securing a load beam to the actuator arm; and

securing the slider to the load beam with a head suspension, the head suspension maintaining the slider pitch at a pitch static attitude of less than zero degrees during the data transfer operations, wherein stiction between the slider and the storage disk is substantially less than if the pitch static attitude was greater than zero degrees during the data transfer operations.

15. The method of claim 14 wherein the head suspension maintains the slider at a pitch static attitude of between zero and approximately negative two degrees.

16. The method of claim 14 wherein the head suspension maintains the slider at a pitch static attitude of less than approximately negative one degree.

17. The method of claim 14 wherein the head suspension maintains the slider at a pitch static attitude of approximately negative two degrees.

18. The method of claim 14 wherein the head suspension maintains the slider at a pitch static attitude of less than negative two degrees.

19. The method of claim 14 wherein the step of providing a slider includes providing a padded slider that includes an air bearing surface and at least one pad that extends below the air bearing surface and contacts the storage disk when the stiction occurs.

20. A disk drive, comprising:

a storage disk; and

a slider including a data transducer that exchanges information with the storage disk during data transfer operations, wherein the slider has a pitch static attitude of less than zero degrees during the data transfer operations, and stiction between the slider and the storage disk is substantially less than if the pitch static attitude was zero degrees during the data transfer operations.

21. The disk drive of claim 20 wherein the pitch static attitude is between zero and negative two degrees.

22. The disk drive of claim 20 wherein the pitch static attitude is between negative one-half degree and negative two degrees.

23. The disk drive of claim 20 wherein the pitch static attitude is approximately negative two degrees.

24. The disk drive of claim 20 wherein the stiction is at least 50% less than if the pitch static attitude was zero degrees during the data transfer operations.

25. The disk drive of claim 20 wherein the stiction is at least 66% less than if the pitch static attitude was zero degrees during the data transfer operations.

26. The disk drive of claim 20 wherein the stiction is at least 75% less than if the pitch static attitude was zero degrees during the data transfer operations.

27. The disk drive of claim 20 wherein the stiction is at least 2 grams less than if the pitch static attitude was zero degrees during the data transfer operations.

28. The disk drive of claim 20 wherein the stiction is at least 3 grams less than if the pitch static attitude was zero degrees during the data transfer operations.

29. The disk drive of claim 20 wherein the stiction is at least 4 grams less than if the pitch static attitude was zero degrees during the data transfer operations.

30. The disk drive of claim 20 wherein the slider includes an air bearing surface and a pad that extends below the air bearing surface and contacts the storage disk when the stiction occurs.

31. A disk drive, comprising:

a storage disk; and

a slider including a data transducer, an air bearing surface and a plurality of pads, wherein the data transducer exchanges information with the storage disk during data transfer operations, the pads extend from the air bearing surface towards the storage disk, the slider has a pitch static attitude of less than zero degrees during the data transfer operations, stiction between the slider and the storage disk is substantially less than if the pitch static attitude was zero degrees during the data transfer operations, and the pads contact the storage disk when the stiction occurs.

32. The disk drive of claim 31 wherein the pitch static attitude is between zero and negative two degrees.

33. The disk drive of claim 31 wherein the pitch static attitude is between negative one-half degree and negative two degrees.

34. The disk drive of claim 31 wherein the pitch static attitude is approximately negative two degrees.

35. The disk drive of claim 31 wherein the stiction is at least 50% less than if the pitch static attitude was zero degrees during the data transfer operations.

36. The disk drive of claim 31 wherein the stiction is at least 66% less than if the pitch static attitude was zero degrees during the data transfer operations.

37. The disk drive of claim 31 wherein the stiction is at least 75% less than if the pitch static attitude was zero degrees during the data transfer operations.

38. The disk drive of claim 31 wherein the stiction is at least 2 grams less than if the pitch static attitude was zero degrees during the data transfer operations.

39. The disk drive of claim 31 wherein the stiction is at least 3 grams less than if the pitch static attitude was zero degrees during the data transfer operations.

40. The disk drive of claim 31 wherein the stiction is at least 4 grams less than if the pitch static attitude was zero degrees during the data transfer operations.